

**[0123]** Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein without departing from the spirit and scope of the invention as defined by the appended claims. Moreover, the scope of the present application is not intended to be limited to the particular embodiments of the process, machine, manufacture, composition of matter, means, methods and steps described in the specification. As one of ordinary skill in the art will readily appreciate from the disclosure of the present invention, processes, machines, manufacture, compositions of matter, means, methods, or steps, presently existing or later to be developed that perform substantially the same function or achieve substantially the same result as the corresponding embodiments described herein may be utilized according to the present invention. Accordingly, the appended claims are intended to include within their scope such processes, machines, manufacture, compositions of matter, means, methods, or steps.

What is claimed is:

1. A method of preparing fibroblasts for use in treatment of a degenerative disc in an individual, comprising the step of exposing fibroblasts to one or more of the following de-differentiation agents:

- a) one or more histone deacetylase inhibitors;
- b) one or more DNA methyltransferase inhibitors;
- c) umbilical cord blood serum;
- d) one or more GSK-3 inhibitors; and/or
- e) one or more components from donor cells.

2. The method of claim 1, wherein the fibroblasts are exposed to reversin, cord blood serum, lithium, a GSK-3 inhibitor, resveratrol, pterostilbene, selenium, (-)-epigallocatechin-3-gallate (EGCG), valproic acid and/or salts of valproic acid, or a combination thereof.

3. The method of claim 1 or 2, wherein the one or more components from the donor cells comprises RNA, DNA, protein, and/or cytoplasm from donor cells.

4. The method of any one of claims 1-3, wherein when the agent is one or more components from donor cells, the fibroblasts are cultured with one or more DNA demethylating agents, HDAC inhibitors, and/or histone modifiers.

5. The method of any one of claims 1-4, wherein the fibroblasts are further exposed to one or more proteolysis inhibitors, inhibitors of mRNA degradation, or both.

6. The method of claim 5, wherein the proteolysis inhibitor is a protease inhibitor, a proteasome inhibitor and/or a lysosome inhibitor.

7. The method of any one of claims 1-6, wherein said histone deacetylase inhibitor is selected from the group consisting of: a) valproic acid; b) sodium phenylbutyrate; c) butyrate; d) trichostatin A; and e) a combination thereof.

8. The method of any one of claims 1-7, wherein said umbilical cord blood serum is used as part of culture media at a concentration of 0.1-20% volume/volume of the tissue culture media.

9. The method of any one of claims 1-8, wherein the exposing step occurs in media having an oxygen content from 0.5 to 21%.

10. The method of any one of claims 1-9, wherein the exposing step occurs in media having glucose content below 4.6 g/l.

11. The method of any one of claims 1-10, wherein an effective mount of the prepared fibroblasts are administered to an individual in need thereof.

12. The method of claim 11, wherein an effective amount of the prepared fibroblasts are administered into the nucleus pulposus and/or the annulus fibrosus of the individual.

13. The method of any one of claim 11 or 12, wherein the fibroblasts are administered to the individual in or with a carrier.

14. The method of claim 13, wherein the carrier comprises one or more of beads, microspheres, nanospheres, hydrogels, gels, polymers, ceramics, and collagen platelet gels.

15. The method of any one of claims 11-14, wherein the fibroblasts are administered to the individual with one or more additional therapeutic agents.

16. The method of claim 15, wherein the therapeutic agent comprises one or more vitamins; nutritional supplements; hormones; glycoproteins; fibronectin; bone morphogenetic proteins (BMPs); differentiation factors; antibodies; gene therapy reagents; anti-cancer agents; genetically altered cells; and/or pain killers.

17. The method of any one of claims 11-16, wherein the fibroblasts are administered to the individual with one or more growth factors.

18. The method of any one of claims 11-17, wherein the administration step further comprises removal of at least some nucleus pulposus and/or annulus fibrosus of the individual.

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